

## CLAIMS

### WHAT IS CLAIMED IS:

1. An emissions monitoring system for continuously monitoring the level of component gases in flue gas, said system comprising:

5 a temperature-controlled sensor module;

at least two electrochemical sensors for measuring the concentration of a predetermined component gas, said at least two electrochemical sensors being disposed in said temperature-controlled sensor module;

10 valves for directing the flow of flue gas and air to said at least two electrochemical sensors;

a controller for controlling the valves such that said at least two electrochemical sensors are alternately exposed to the flue gas and to air wherein one of said at least two electrochemical sensors is providing a measurement of the concentration of the predetermined component gas and another one of said  
15 at least two electrochemical sensors is recalibrated with reference to clean ambient air.

2. The emission monitoring system of Claim 1 wherein said temperature-controlled sensor module comprises a thermoelectric heating/cooling unit to maintain the temperature within said temperature-controlled sensor module.

20 3. The emission monitoring system of Claim 2 wherein said thermoelectric heating/cooling unit maintains the temperature within said temperature-controlled sensor module to approximately 30°C - 40°C.

25 4. The emission monitoring system of Claim 2 wherein said thermoelectric cooling unit comprises an access door and wherein said thermoelectric cooling unit maintains a flow of dry air to evaporate any condensation formed on the sensors while said access door was open.

5. The emission monitoring system of Claim 1 wherein said at least two electrochemical sensors provide the level of said predetermined component gas as low as 0.1 ppm.

6. The emission monitoring system of Claim 1 wherein the predetermined component gas can be NO, NO<sub>2</sub>, SO<sub>2</sub>, CO or O<sub>2</sub>.

30 7. The emission monitoring system of Claim 1 wherein said controller controls said valves to allow both of said at least two sensors to detect the concentration of the predetermined component gas simultaneously for a predetermined period of time to form two respective outputs, said two respective outputs being compared by said controller.

8. The emission monitoring system of Claim 8 wherein said controller provides an alert if said two respective outputs differ from each other by a predetermined amount.

9. A sensor assembly for continuously detecting the concentration of component gases in flue gas, said sensor assembly comprising:

5                   a temperature-controlled sensor module;

                  at least two electrochemical sensors for measuring the concentration of a predetermined component gas, said at least two electrochemical sensors being disposed in said temperature-controlled sensor module and being alternately exposed to the flue gas and to air so that one of said at least two electrochemical sensors is providing a level of the predetermined component gas and another one of said at least two electrochemical sensors is recalibrated with reference to clean ambient air.

10               10. The sensor assembly of Claim 9 wherein said temperature-controlled sensor module comprises a thermoelectric heating/cooling unit to maintain the temperature within said temperature-controlled module.

                  11. The sensor assembly of Claim 10 wherein said thermoelectric heating/cooling unit maintains the temperature within said temperature-controlled sensor module to approximately 30°C - 40°C.

20               12. The sensor assembly of Claim 9 wherein said at least two electrochemical sensors provide the level of said predetermined component gas as low as 0.1 ppm.

                  13. The sensor assembly of Claim 9 wherein the predetermined component gas can be NO, NO<sub>2</sub>, SO<sub>2</sub>, CO or O<sub>2</sub>.

                  14. A method for continuously monitoring the concentration of component gases in flue gas, said method comprising the steps of:

25                   providing at least two electrochemical sensors for measuring the concentration of a predetermined component gas;

                  alternately exposing one of said at least two electrochemical sensors to the flue gas and another one of said at least two electrochemical sensors to air.

30               15. The method of Claim 14 further comprising the step of maintaining the temperature of said at least two electrochemical sensors between approximately 30°C - 40°C.

                  16. The method of Claim 14 wherein said step of maintaining the temperature comprises using thermoelectric heating and cooling.

17. The method of Claim 15 wherein said at least two electrochemical sensors measure the concentration of the predetermined component gas as low as 0.1 ppm.

18. The method of Claim 14 wherein said step of alternately exposing one of said at least two electrochemical sensors comprises:

5                   intermittently allowing both of said at least two sensors to detect the level of the predetermined component gas simultaneously for a predetermined period of time to form two respective outputs; and

                  comparing said two respective outputs to determine if they are within a predetermined window.

10               19. The method of Claim 18 wherein said predetermined window comprises less than 5% of reading when the rate of change is less than 1ppm/sec.